ORIGINAL ARTICLE

Effects of Mulligan Traction Straight Leg Raise Versus Passive Straight Leg Raise in Lumbar Radiculopathy Patients

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ABSTRACT

Objective: To compare the effects of Mulligan traction straight leg raise and passive straight leg raise in patients with lumbar radiculopathy.

Study Design: Randomized Control Trial.

Place and Duration of Study: The study was conducted from 2nd February 2017 to 30th June2017 at National Institute of Rehabilitation Medicine, Islamabad

Materials and Methods: A total of 38 patients of either gender with age range of 40 to 60 years with low back pain and lumbar radiculopathy were recruited in the study and they were randomly allocated in to two groups through lottery method, Traction straight leg raise, and Passive straight leg raise group. Patients with spinal surgeries and fractures were excluded from the study. Conventional physiotherapy treatments including transcutaneous electrical nerve stimulation, hot pack, stretching and strengthening exercises were given to all patients. Traction Straight leg raise Technique was performed on patients of experimental group and Passive Straight leg raise was performed on control group. Patients were assessed on baseline and after 4 weeks through Numeric pain rating scale, Oswestry disability index, and goniometer. Treatment duration was of 4 weeks with 2 sessions per week.

Results: Mean age of all patients was 53.60 ± 3.82. Experimental group showed much reduction in pain with pre median =6(1) and post median=2(1) as compared to control group pain with pre median= 6(1) and post median=4(1) on pain scale. Traction Straight leg raise also showed significant improvement in Range of motion with pre median=50(10) and post median=70(10) of experimental group as compared to SLR of control group with pre median= 50(15) and post median= 60(10). Statistically both groups showed improvement, but experimental group improvement was more significant.

Conclusion: Traction straight leg raise is more effective than Passive straight leg raises in decreasing pain and improving range of motion in patients with lumbar radiculopathy

Key Words: *Goniometer, Oswestry Disability Index, Passive Straight Leg Raise, Traction Straight Leg Raise.*

Introduction

Low Back Pain is a common musculoskeletal discomfort, localized below the costal margin and above the inferior gluteal folds, with or without leg pain, affecting majority of adults and is the most common cause of disability in developed countries.[1] LBP results in increasing levels of disability, activity restriction and lack of participation, such as an inability to work.[3] In general population, there is an estimation that yearly incidence of first ever episode of LBP is 6.3% to 15.4%.Its prevalence increases in 60 to 65 years of age.[4] In general population prevalence of Chronic LBP ranges from 15 to 45%.[5] In Lumbar radiculopathy, pain occurs in the lower back and radiates around hip region and down the posterior aspect of the thigh into the legs. Symptoms are shooting pain, numbness and tingling in buttock and leg.[6] Damage is caused by the nerve roots compression that exit the spine from level L1 to S1.[7] Prevalence of lumbar radiculopathy been reported up to 5%.[8] Prevalence of lumbar radiculopathy is reported to be 11% out of 12.9% in working population.[9] Lumbosacral radiculopathy is up to 9.9% to 25%.[10] Repetitive load on the spine is the common

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Received: September 14, 2021; Revised: May 23, 2022
Accepted: June 02, 2022

risk factor for radiculopathy. It is most found in patients who are involved in heavy labour.[11] There are numerous treatment options in literature for managing it. Physical therapy treatment includes muscle stretching, Traction, McKenzie exercise, TENS, ultrasound, Interferential therapy, hot pack".[12] Passive SLR test is frequently used by clinicians to diagnose lumbar radiculopathy and check hamstring tightness.[13] Techniques developed by Brian Mulligan are effective in treating radiculopathy i-e Mobilization with Movement (MWM) of extremities and Spinal Mobilization with Limb Movement (SMWLM's). Edmonton and Singer emphasized for the use of sustained natural Apophyseal glides that was first presented by Mulligan to restore pain-free joint mobility. Sustained natural Apophyseal glides have been reported for their benefits in acute and sub-acute thoracic spine conditions.[14] TSLR is a MWM technique of Mulligan and is used in treating lumbar radiculopathy and hamstring tightness. It is reported in literature that MWMs for managing LBP are used by many therapists as a part of their treatment approach. Majority of therapists using these had several years of experience in the treating of LBP with MWMs. Many therapists reported improvement in active spinal ROM and pain relief immediately after the use of MWMs[8-9]

The purpose of the study was to compare the effects of Mulligan traction straight leg raise and passive straight leg raise in patients with lumbar radiculopathy. Many patients with recurring low back pain have tight hamstrings, Traction SLR increase range of movement in few treatments. This study investigated whether Mulligan's TSLR is better treatment for the patients suffering with Low back pain with radicular symptoms.

Materials and Methods

Study design was randomized controlled trial and data was collected from Physical therapy OPD of National Institute of Rehabilitation Medicine Islamabad from 2nd January2017 to 30th June 2017.Patients of both gender with 40 -60 years of age having low back pain and lumbar radiculopathy were included in the study. The study was approved from ethical review board of Riphah International University with Ref No. RIPHAH/RCRS/REC/00201. Patients with inflammatory conditions, spinal surgeries and fractures were excluded. A sample size of 38 was calculated through open epitool.[15] Patients were randomly allocated in groups.18 patients were in experimental group (Mulligan Traction straight leg raise) and 20 patients were in control group (Passive straight leg raise). 3 patients from experimental and 5 patients from control group were dropout and 30 patients completed the follow-up. 15 were from experimental group and 15 were in control group. Passive straight leg raise (SLR) group patients were treated with Hot pack (10 min), high-rate TENS for 15 min at 70Hz frequency[16], stretching exercises (Hamstring stretch, Calf stretching), Bridging exercise for back 3times per day with 10 repetitions and Passive straight leg raise (3 sets of 10 repetitions). Mulligan Traction straight leg raise (TSLR) group patients were treated with TSLR technique (3 repetitions per session) and same conventional Physical therapy treatment as control group were followed for this group. Patients were educated regarding correct posture in standing, sitting, and weightlifting. Home plan was given to patients that included stretching and strengthening exercises for back and leg. Patients of both groups were asked to visit hospital twice a week. Traction SLR and Passive SLR techniques were performed on the patients of respective groups, and they were suggested to repeat the prescribed exercise home plan twice a day with 10 repetitions for 4 weeks. Patients were assessed through numeric pain rating scale (NPRS) for pain intensity, Oswestry disability index (ODI) for functional disability and Goniometer for Range of motion of hip joint. Statistical analysis was done through SPSS version 21. Parametric tests were applied for ODI because p value was > 0.05 and non-parametric tests were applied for NPRS, and straight leg raise because p value was < 0.05.

Results

Among 30 patients, 8 were male and 22 were female. Mean age of all patients was 53.60 ± 3.82. Majority of the patients affected with lumbar radiculopathy were housewives (83.3%).33.3% patients were having pain for more than 1 year,10% were having pain from less than 1 year. Overall, 53.3 % participants presented with back pain radiating to right leg and 46.7 % came with pain radiation to left leg. Frequency of nature and type of pain and other demographic variables are shown in Table I.

Table I: Demographic Data of Patients

Variables	Both groups	Group (Experimental)	Group (Control)
Age	53.60 ± 3.82	53.60 ± 3.62	53.60± 4.13
Pain Radiation Right leg Left leg	 53.3 % 46.7 %	 46.7 % 53.3 %	 60 % 40 %
Onset of pain Sudden Gradual	 13.3% 86.7%	 6.7% 93.3%	 20% 80%
Type of pain Sharp Dull Constant Intermittent	 3.3% 30% 46.7% 16.7%	 6.7% 33.3% 40% 13.3%	 0% 26.7% 53.3% 20%
Time Duration < 3 months <6 months < 1 year	 26.7% 30% 10%	 26.7% 20% 13.3%	 26.7% 40% 6.7%

For inferential analysis, test variables including NPRS, ODI and SLR were assessed by Shapiro Wilk test to identify the normality of data at baseline. Lumbar Oswestry Disability Index data was normally distributed with p-value> 0.05 therefore parametric tests (Independent sample T-test and Paired sample T-test) were applied. Whereas non-parametric tests i.e. Mann-Whitney and Wilcoxon signed rank tests for SLR and NPRS were applied as data was skewed for these variables with p-value < 0.05.

NPRS and SLR post treatment showed improvement in terms of pain and range of motion in both groups with p value < 0.05 whereas more significant improvement in pain was observed in experimental group with pre-treatment mean 5.80 ± 0.86 and post treatment mean 1.80 ± 0.77 and range of motion was also more significantly increased in experimental group with pretreatment mean 49.66 ± 4.41 and post treatment mean 71.00 ± 5.73 as shown in tale #II

Table II: Mann Whitney U Test between Control and Experimental Group Comparison

Test Variables	Group Allotted to Participants	Pre-Mean ± S. D	Post-Mean± S. D	Mean Rank	Z-value	P-Value
Numeric Pain Rating Scale	Control	6.20 ± 0.77	3.73 ± 0.45	22.60	-4.59	0.001
	Experimental	5.80 ± 0.86	1.80 ± 0.77	8.04		
Straight leg Raise	Control	50.66 ± 7.28	58.33 ± 7.23	9.27	-3.95	0.001
	Experimental	49.66 ± 4.41	71.00 ± 5.73	21.73		

Oswestry disability index post treatment showed improvement in control and experimental group with p value <0.05 (0.001). More significant improvement in Traction SLR group was observed, as shown in Figure 1.

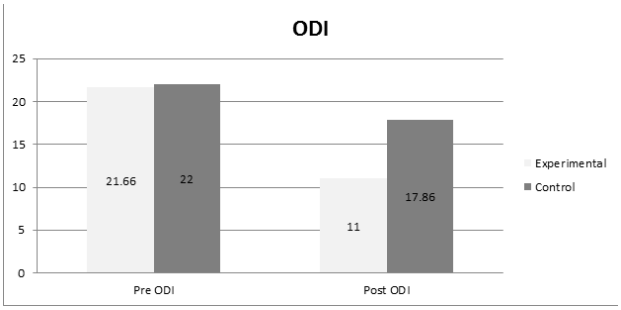

Fig. 1: Differences in ODI Between Control and Experimental Group

Discussion

The Purpose of this study was to compare the effects of Mulligan TSLR and passive SLR on patients with lumbar radiculopathy. The results of our study show that female experience low back pain with radiculopathy more than male. It is also observed in the study conducted by Aimin Wu et al.[17] Traction straight leg raise (TSLR) is effective in reducing low back pain caused by radiculopathy and improves SLR range. The reduction in pain on NPRS is more likely to the fact that TSLR technique is more directed to specific functional movements of lumbar spine. It targets the joint restrictions. Improved blood circulation also reduce pain.[18] The results of current study are similar to the results of study conducted by Pooja Kapadia et al on patients with hamstring tightness in which TSLR technique improved SLR range in patients with hamstring tightness and lumbar radiculopathy.[19] In this study it is also noted that TSLR technique improves stretch tolerance of hamstring muscles as well. This technique is more effective in reducing low back pain and increasing extensibility of neural structure, low back extensors and posterior thigh musculature as compared to passive SLR. This study correlates with the results of an RCT, conducted by Yıldırım, Meric Senduran, et al to compare the effectiveness of Static stretching and Mulligan TSLR on hip flexion ROM. The group in which TSLR was given showed significant improvement in hip flexion with p-value of 0.016 and 0.02 respectively after 4 weeks.[20]Riaz MU et al conducted another clinical trial in patients with

lumbar radiculopathy and results of the study showed improvement in ODI. This proves that Mulligan's technique is more effective in improving function.[21] The current study also shows that Mulligan's TSLR is effective in improving activities of daily living and increasing back muscle and hamstring extensibility in patients with lumbar radiculopathy. Mazumdar, J. et al conducted an RCT to compare the effectiveness of Mulligan TSLR and Muscle Energy Technique on Hamstring Tightness in male patients. Results showed that both techniques were effective reducing hamstring tightness.[22] The current study also have similar results. A systemic review conducted by Pourahmadi MR et al stated that Mulligan's straight leg and Bent leg raise techniques are effective in reducing pain and increasing hip flexion ROM in patients with unilateral lumbar radiculopathy.[23] This study also has similar results in improving SLR range with a p-value of 0.001.

Limitations

This study has limitation of small sample size. Limited sessions have been provided to patients and long term follow up could not be carried out.

Recommendation

Future studies should be conducted on larger sample size to determine the long-term effect of TSLR on strength and flexibility of thigh musculature. EMG studies can also be incorporated to assess the muscular activities during the application of different Mulligan's techniques.

Conclusion

This study concludes that Mulligan Traction Straight Leg Raise combined with conventional physiotherapy treatment show more significant improvement in Range of Motion, pain reduction and improving function when compared with passive Straight leg raise.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

GRANT SUPPORT AND FINANCIAL DISCLOSURE

Authors have declared no specific grant for this research from any funding agency in public, commercial or nonprofit sector.

DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.